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(56) Documents Cited

GB 2272458 A EP 0801158 A EP 0627508 A  
US 5040272 A

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(54) Abstract Title

**Device at a spinning preparation machine for measuring distances between clothings**

(57) A spinning preparation machine, e.g. a carding machine, cleaner or the like, includes a device for measuring distances between surfaces, in which device a clothed roller 4 co-operates with a clothed counter surface, e.g. a card in order to enable detection of wear (especially after a relatively long running time) in a simple manner during operation and to enable optimum adjustment of the carding nip, sensor means 19 is associated with the card top 13 and is positioned opposite the clothing 20 of the card top bars 14.

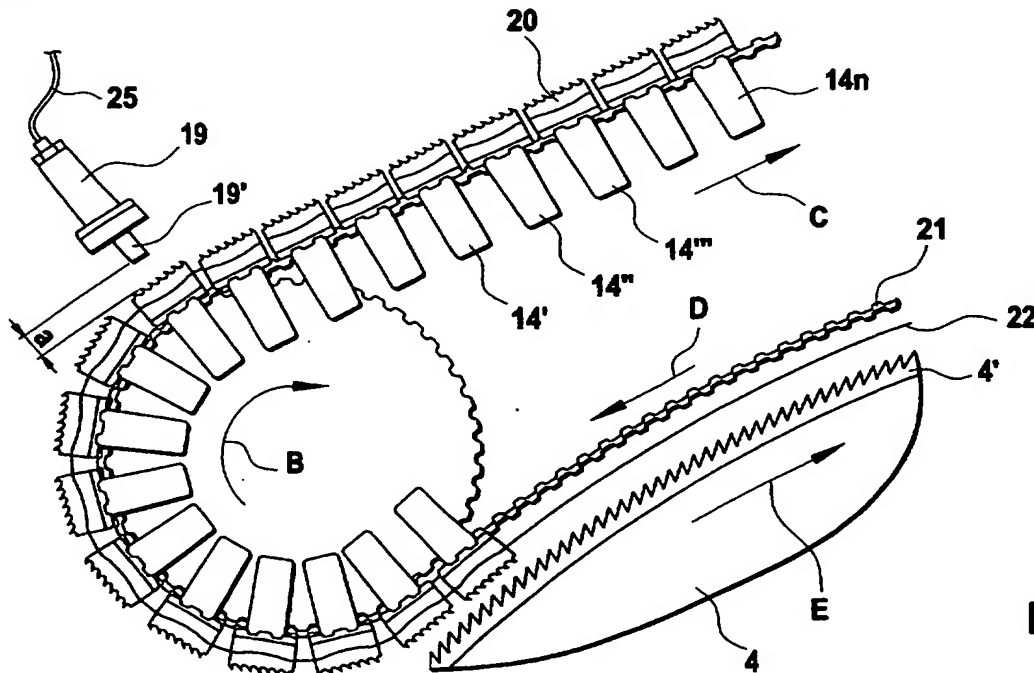


Fig. 3

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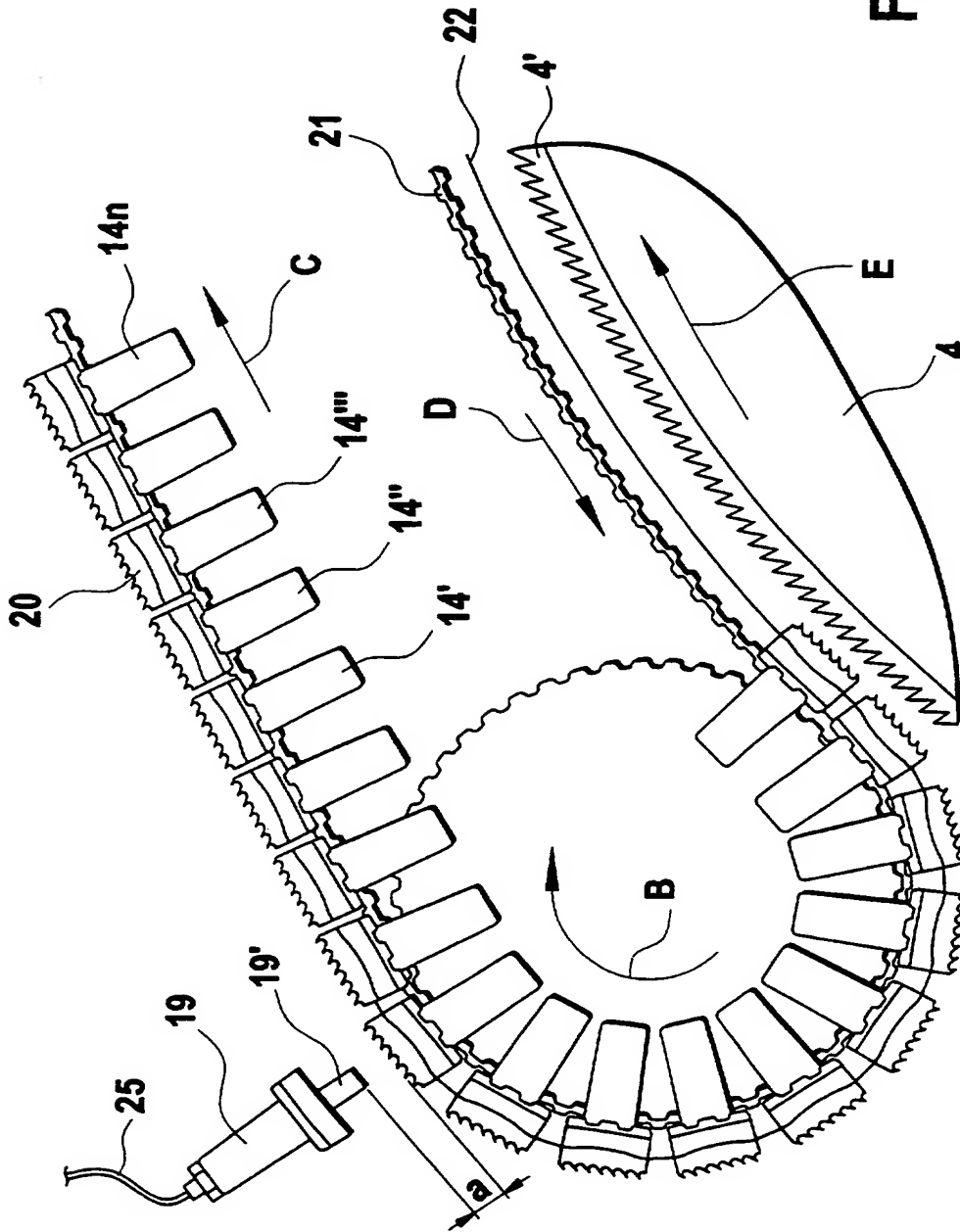


Fig. 3

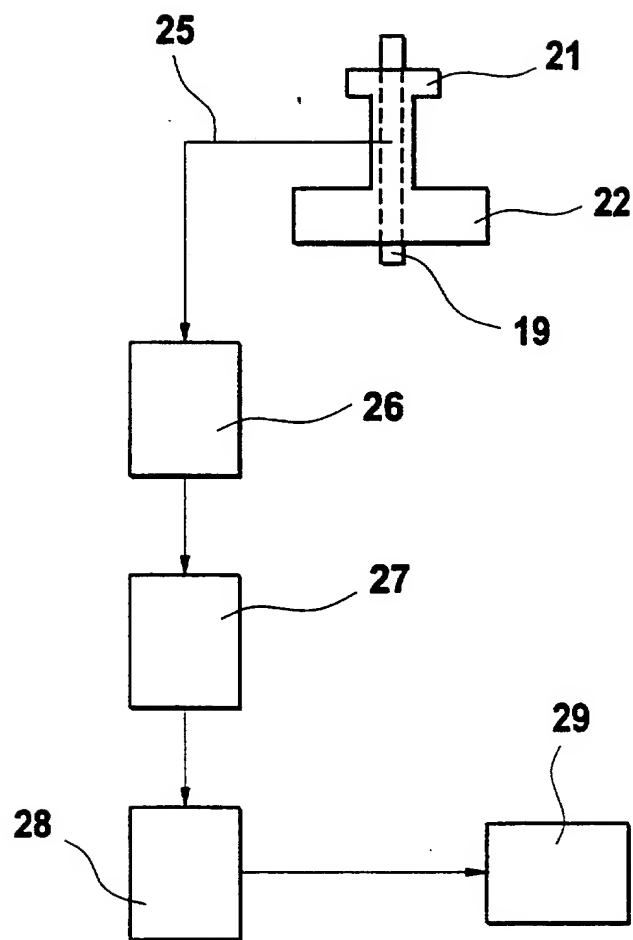


Fig. 4

Device at a spinning preparation machine  
for measuring distances between clothings

The invention relates to a device at a spinning  
5 preparation machine, for example a carding machine, cleaner  
or the like, for measuring distances between clothings.

The distances between the cylinder clothing and those  
surfaces opposite thereto (counter surfaces) are of  
considerable significance from a machine and fibre  
10 technological standpoint. The carding result, that is to  
say the degree of cleaning, formation of neps and fibre  
shortening, is substantially dependent upon the carding nip,  
that is to say the distance between the cylinder clothing  
and the clothings of the revolving and fixed card tops. The  
15 guiding of air around the cylinder and the discharge of heat  
are also dependent upon the distance between the cylinder  
clothing and clothed or non-clothed surfaces opposite  
thereto, for example separating blades or casing elements.  
The distances are subject to various, to some extent  
20 counteracting, influences. The wear upon clothings facing  
one another results in a widening of the carding nip, which  
is associated with an increase in the nep count and with a  
decrease in fibre shortening. An increase in the rotational  
speed of the cylinder, for example to increase the cleaning

action, results in an expansion of the cylinder including the clothing as a result of centrifugal force and thus in a reduction in the carding nip. The cylinder also expands during processing of large amounts of fibre and of

5 particular types of fibre, for example synthetic fibres, as a result of a rise in temperature, with the result that the distances decrease for that reason also.

The carding nip is influenced especially by the machine settings on the one hand and by the condition of the

10 clothing on the other hand. The most important carding nip of the revolving card top carding machine is located in the main carding zone, that is to say between the cylinder and the revolving card top assembly. At least one clothing that borders the working spacing is in motion, and generally both

15 are. In order to increase the production of the carding machine, it is sought to select the operating rotational speed or the operating speed of the movable elements as high as fibre processing technology will allow. The working spacing lies in the radial direction (starting from the axis  
20 of rotation) of the cylinder.

In carding, ever greater amounts of fibre material are being processed per unit of time, which calls for higher speeds of the working members and higher installed capacities. Even when a working surface remains constant,

greater fibre material throughput (production) results in increased generation of heat as a result of the mechanical work. At the same time, however, the technological carding result (sliver uniformity, degree of cleaning, nep reduction, etc.) is continuously being improved, which calls for more operative surfaces engaged in carding and for narrower adjustments of those operative surfaces relative to the cylinder (drum). The amount of synthetic fibres to be processed, in which - in comparison with cotton - more heat is generated by friction in contact with the operative surfaces of the machine, is constantly increasing. The working members of high-performance carding machines are nowadays fully enclosed on all sides in order to meet the high safety standards, to prevent particle emission in the spinning environment and to minimise the need for maintenance of the machines. Gratings or even open material-conveying surfaces that enable air exchange are a thing of the past. As a result of the circumstances mentioned, the amount of heat generated in the machine is markedly increased, whilst the discharge of heat through convection is markedly reduced. The resulting greater heating of high-performance carding machines results in greater thermo-elastic deformations which, on account of the non-uniform distribution of the temperature field, have an

effect upon the adjusted distances between the operative surfaces: the distances between the cylinder and card top, doffer, fixed card tops and separating sites decrease. In an extreme case, the adjusted nip between the operative  
5 surfaces can be fully taken up by thermal expansion, with the result that components that move relative to one another will collide. This results in quite substantial damage to the high-performance carding machine affected. Having said all that, in particular the generation of heat in the  
10 working region of the carding machine can result in different thermal expansions where the differences in temperature between components are too great.

In practice, the quality of the clothing of the card top bar clothings is regularly assessed visually by a  
15 person, with wear resulting in an increase in the carding nip. In a known device (EP 0 801 158) a sensor is provided, by means of which the working distance between carding clothings (also called "carding nip") can be measured, that is to say the effective distance of the tips of a clothing  
20 from a machine element positioned opposite to the clothing. The last-mentioned element may also have a clothing, but could alternatively be formed by a casing element having a guiding surface. The sensor is designed especially for measuring the working distance between the cylinder and the

card tops of a revolving card top assembly, wherein the carding distance between the cylinder clothing and the card top clothings is to be detected from the side of the working region by means of an optical apparatus. A disadvantage  
5 thereof is that the change in the carding nip provides no information as to whether and, if so, to what extent the change can be attributed to wear of the cylinder clothing, of the card top bar clothing or of both.

It is an aim of the invention to provide a device that  
10 avoids or mitigates the mentioned disadvantages, in particular enables detection of wear (especially after a relatively long running time) in a simple manner during operation and enables optimum adjustment of the carding nip.

The invention provides a device at a spinning  
15 preparation machine for determining spacing between surfaces, in which device a clothed roller cooperates with a counter surface of a counter element, the device comprising sensor means associated with the counter element and positioned opposite the counter surface for detecting the  
20 distance to the counter surface.

In accordance with the invention sensor means is associated with a counter element, for example, with a card top. The sensor means is thus so arranged that it can be positioned in a selected position relative to the counter

element for determining a distance from a surface of the counter element. As a result of the measures according to the invention, it is possible to establish the wear and tear of a clothing of the counter surface, for example, the card top clothing, especially after a relatively long running time. When there is a change in the carding nip, the effect of the change in the card top clothing can be determined both directly in relation to the wear and indirectly in respect of the change in distance to the roller, which may for example be a carding cylinder, especially as a result of wear of the roller clothing, expansion of the roller as a result of centrifugal force and temperature change. This enables an optimum adjustment of the carding nip, namely with respect to a target value. Measurement is possible during ongoing operation. A further advantage is that the geometrically highest card top bar may be located. Adjustment of the card top bar after grinding of the card top bar clothing is also made possible.

Advantageously, the counter surface is a clothed counter surface, for example, a card top, the sensor means being positioned opposite the clothing of the card top bars. Advantageously the card top bars are part of a revolving card top of a carding machine. Preferably the sensor is stationary. Advantageously the sensor is able to

detect wear of the card top bar clothing. Preferably the sensor is able to detect a displacement of the card top bar clothing. Preferably the sensor is able to detect a displacement of the card top bar clothing as a result of thermal expansion. Advantageously the sensor detects the distance between the sensor and the tips of the card top clothing. Preferably a capacitive sensor is present. Advantageously the sensor is provided with a fine screw thread for height adjustment. Preferably a distance is present between the measuring surface of the sensor and the clothing tips. Advantageously the measured distance is used as an input value in a controlling and regulating device for regulating the distance between the card top clothings and the cylinder clothing. Preferably the radial distance (a) between the roller clothing and the carding segment clothing can be adjusted by the position and/or shape of a flexible bearing layer arranged between the end portions of the carding segments and a stationary supporting surface of the machine. Advantageously the measured distance is used to regulate the distance between a clothed and/or non-clothed cover element of the cylinder and the cylinder clothing. Preferably the radial distance (a) between the roller clothing and the reciprocal element can be adjusted by the position and/or shape of a flexible bearing layer arranged

between the end portions of the reciprocal elements and a stationary supporting surface of the machine.

Advantageously a sensor is associated with the card top and is positioned opposite the clothing of the cylinder.

5 Preferably the sensor detects the distance between the sensor and the tips of the cylinder clothing.

Advantageously the sensor and the adjusting means are connected to an electronic controlling and regulating device. Preferably the electrical controlling and

10 regulating device has a memory for target values for the distance. Advantageously when the target value is exceeded a switching process, a display or the like is triggered.

Preferably the device for adjusting the distance is actuated by manual entry, e.g. push buttons. Advantageously a

15 parameter correlating to a change in the working distance, e.g. temperature, is measured to produce a measured value relating to the working distance. Preferably the position of the card top clothing is adjusted in dependence upon a predetermined value. Advantageously an inductive sensor is  
20 present.

The invention further provides a device at a spinning preparation machine, for example a carding machine, cleaner or the like, for measuring distances at clothings, in which device a clothed roller co-operates with a clothed counter

surface, for example a card top, and in which at least one sensor is present, by means of which the distance to a clothed surface can be detected, wherein the sensor is associated with the card top and is positioned opposite the clothing of the card top bars. Moreover, the invention provides a method of determining the spacing between a clothed roller and a counter surface, comprising positioning the counter surface opposite sensor means and determining the distance of the counter surface from the sensor means.

Certain illustrative embodiments of the invention will be described hereinafter in greater detail with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic side view of a carding machine having a device according to the invention;

Fig. 2 is a front view of the device of Fig. 1 positioned opposite the clothing of a card top bar of a revolving card top of a carding machine;

Fig. 3 is a side view of a revolving card top in the region of a card top turning roller together with a device according to the invention; and

Fig. 4 is a block diagram.

Fig. 1 shows a carding machine, e.g. an EXACTACARD DK 803 manufactured by Trützschler GmbH & Co. KG, having a feed

roller 1, a feed table 2, lickers-in 3a, 3b, 3c, a cylinder 4, a doffer 5, a stripper roller 6, nip rollers 7, 8, a web-guiding element 9, a sliver funnel 10, delivery rollers 11, 12, a revolving card top 13 having card top bars 14, a can 15 and a can coiler 16. The directions of rotation of the rollers are indicated by curved arrows. The letter M denotes the centre point (axis) of the cylinder 4. The direction of rotation (arrows A, B) of the front and rear card top turning rollers 13a, 13b (toothed belt wheels) is opposite to the direction of rotation (arrow E) of the cylinder 4. The card top bars 14 are drawn by an endless toothed belt by way of the guide elements. The card top bars 14 located on the endless toothed belt are returned in the direction of arrow C on the upper side of the revolving card top 13 opposite the slideway. A stationary sensor 19, which is positioned opposite to and spaced from the card top bars 14, is associated with the clothings 20 of the returned card top bars 14.

Associated with the clothings 20 of the card top bars 14 is a slow-speed rotating card top brush 17, the clothing of which engages the clothing of a high-speed rotating cleaning roller 18.

As can be seen in Fig. 2, three sensors 19a, 19b, 19c are arranged distributed across the length of the card top

bar 14, the sensor surfaces 19', 19'' and 19''' being directed towards the clothing 20 of the card top bar 14 spaced at a distance a therefrom. Fine screw threads 21a, 21b and 21c enable the adjustment of the distance a relative to the card top clothing 20. The sensors 19a, 19b, 19c are secured in a holding device 22 mounted in a fixed position on the machine frame by means of screws 23a, 23b.

In the embodiment of Fig. 3, a sensor 19 is arranged opposite the clothing 20 of a card top bar 14, which continues to move slowly (80 to 300 mm/min) in the direction of arrow C. The reference numeral 25 denotes an electrical line of the capacitive sensor 19

According to Fig. 4, the sensor 19 is connected by way of the line 25 to the electronic evaluating device 26, which displays and stores the values determined. The evaluating device 26 is connected to the electronic controlling and regulating device 27 of the carding machine, which emits signals for the adjustment means 28 for working elements of the carding machine, which adjusts the carding nip between the clothings 20 of the card top bars 14 and the clothing 4' of the cylinder 4. At the same time, this information is forwarded to the carding information system KIT of a computing and display unit 29, where the data of a complete carding group are monitored.

Claims

1. A device at a spinning preparation machine for determining spacing between surfaces, in which device a clothed roller cooperates with a counter surface of a counter element, the device comprising sensor means associated with the counter element and positioned opposite the counter surface for detecting the distance to the counter surface.

2. A device according to claim 1, wherein the counter surface is clothed, the sensor means being positioned opposite the clothing of the counter surface.

3. A device according to claim 2, in which the counter element is a card top, the sensor means being positioned opposite the clothing of the card top bars.

4. A device according to claim 3, wherein the card top bars are part of a revolving card top of a carding machine.

5. A device according to claim 4, wherein sensor means is associated with the card top and is positioned opposite the returned card top bars.

6. A device according to any one of claims 2 to 5, wherein the sensor means is stationary.

7. A device according to any one of claims 2 to 6,  
wherein the sensor means is able to detect wear of the  
counter surface clothing.

8. A device according to any one of claims 2 to 7,  
5 wherein the sensor means is able to detect a displacement of  
the counter surface clothing as a result of thermal  
expansion.

9. A device according to any one of claims 2 to 8,  
wherein the sensor means detects the distance between the  
10 measuring surface of the sensor means and the tips of the  
counter surface clothing.

10. A device according to any one of claims 2 to 9,  
wherein the sensor means comprises a least one capacitive  
sensor.

15 11. A device according to any one of claims 2 to 10,  
wherein the sensor means includes screw threaded adjustment  
means for height adjustment.

12. A device according to any one of claims 2 to 11,  
wherein a predetermined distance is present between a  
20 measuring surface of the sensor means and the clothing tips.

13. A device according to claim 12, wherein the  
predetermined distance is used as an input value in a  
controlling and regulating device for regulating the spacing

between the counter surface clothings and the roller clothing.

14. A device according to claim 12 or claim 13,  
wherein the radial spacing between the roller clothing and  
5 the counter surface clothing can be adjusted by the position  
and/or shape of a flexible bearing layer arranged between  
end portions of the counter surface and a stationary  
supporting surface of the machine.

15. A device according to any one of claims 12 to 14,  
10 wherein the predetermined distance is used to regulate the  
spacing between a clothed and/or non-clothed cover element  
of the roller and/or a separating blade of the roller  
clothing.

16. A device according to any one of claims 1 to 15,  
15 wherein the radial distance between the roller clothing and  
the counter element can be adjusted by the position and/or  
shape of a flexible bearing layer arranged between the end  
portions of the counter element and a stationary supporting  
surface of the machine.

20 17. A device according to any one of claims 1 to 16,  
wherein the counter surface is clothed and the sensor means  
is arranged to detect the distance between the sensor means  
and the tips of the counter surface clothing.

18. A device according to any one of claims 1 to 17,  
wherein the sensor means comprises at least one inductive  
sensor.

19. A device according to any one of claims 1 to 18,  
5 wherein the sensor means comprises at least two sensors.

20. A device according to any one of claims 1 to 19,  
which includes a control and regulating device.

21. A device according to claim 20, in which the  
sensor means and the adjusting means for the sensor means  
10 are connected to the control and regulating device.

22. A device according to claim 20 or claim 21,  
wherein the control and regulating device has a memory for  
target values for the distance from the counter surface.

23. A device according to claim 22, wherein the  
15 control and regulating device is so arranged that, when the  
target value is exceeded, a switching process, a display or  
the like is triggered.

24. A device according to any one of claims 20 to 23,  
wherein a device for adjusting the distance from the counter  
20 surface can be actuated by manual entry, e.g. push buttons.

25. A device according to any one of claims 20 to 24,  
wherein the arrangement is such that a parameter correlating  
to a change in the working spacing, e.g. temperature, can be

measured to produce a measured value relating to the working spacing.

26. A device according to any one of claims 20 to 25, wherein the position of the counter surface is adjustable in dependence upon a measured value relating to the working spacing to maintain the working spacing at a predetermined value.

27. A device at a spinning preparation machine, for example a carding machine, cleaner or the like, for measuring distances at clothings, in which device a clothed roller co-operates with a clothed counter surface, for example a card top, and in which at least one sensor is present, by means of which the distance to a clothed surface can be detected, wherein the sensor is associated with the card top and is positioned opposite the clothing of the card top bars.

28. A device for determining spacings between working surfaces of a spinning preparation machine, substantially as described herein with reference to and as illustrated by any of Figs. 1 to 4.

29. A spinning preparation machine comprising a device according to any one of claims 1 to 28.

30. A method of determining the spacing between a clothed roller and a counter surface, comprising positioning

the counter surface opposite sensor means and determining the distance of the counter surface from the sensor means.

31. A method according to claim 30, in which the spacing between the clothed roller and the counter surface  
5 at a working region is adjusted in dependence on the determined distance.



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Examiner: G R A H A M  
WERRETT

Claims searched: 1-31

Date of search: 14 June 2000

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): D1N.

Int Cl (Ed.7): D01G.

Other: Online : WPI, EPODOC, PAJ.

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2272458 A (TRUTZSCHLER) see e.g. p.11, l.16 on.	1, 27, 30.
X	EP 0801158 A1 (RIETER) see e.g. Fig. 13 & abstract.	„
X	EP 0627508 A1 (RIETER) see e.g. Fig. 2 & abstract.	„
X	US 5040272 (RIETER) see e.g. Fig. 1.	„

X Document indicating lack of novelty or inventive step  
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A Document indicating technological background and/or state of the art.  
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